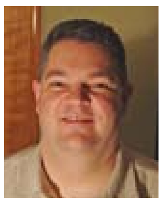
Notes from the field

Each year we ask a few researchers and practitioners to contribute articles to *Keeping Pace*. These "Notes from the Field" differ from the rest of *Keeping Pace* in that they are not based primarily on the research done for *Keeping Pace*, but instead reflect the research and experience of the authors in a specific area. We thank these authors for their contributions!

Quality Standards for Online Programs

Liz Pape, Virtual High School Global Consortium
Matthew Wicks, Matthew Wicks & Associates

Liz Pape and Matthew Wicks are Co-chairs for the iNACOL Quality Standards for Online Programs Committee.

Over the past three years, the International Association for K-12 Online Learning (iNACOL) has invested much time and effort in establishing voluntary national standards for all K-12 online learning programs. Starting in 2007, iNACOL conducted comprehensive literature reviews and research surveys of existing online course and teaching standards. Based on the research, iNACOL adopted online course and teaching standards that had been published by the Southern Regional Education Board (SREB). The resulting *National Standards for Quality Online Courses* included the SREB *Quality Online Course Standards*[1] and added an additional standard to address 21st Century Skills. For iNACOL's *National Standards for Quality Online Teaching*, iNACOL adopted SREB's *Standards for Quality Online Teaching and Online Teaching Evaluation for State Virtual Schools*.[2] The National Standards also added three additional standards for online teaching.

In 2009, the third area of standards, *National Standards of Quality for Online Programs*, was released. These three sets of standards are inter-related and when used together, they provide the basis for a comprehensive assessment of program quality.

Unlike the first two sets of iNACOL national standards, the online program standards did not involve the endorsement of existing standards. Instead these standards are based on ideas and concepts from roughly 20 other documents along with contributions from experienced online learning practitioners.

The online program standards are divided into four areas: institutional, teaching and learning, support, and evaluation.

[1] iNACOL, *National Standards for Quality Online Courses*; retrieved September 14, 2009, http://www.inacol.org/research/bookstore/detail.php?id=6, and SREB, *Quality Online Course Standards*; retrieved September 14, 2009, http://www.sreb.org/programs/EdTech/pubs/2006Pubs/06T05_Standards_quality_online_courses.pdf

[2] iNACOL, *National Standards for Quality Online Teaching*, http://www.inacol.org/research/nationalstandards/NACOL%20Standards%20Quality%20Online%20Teaching.pdf

Institutional standards address the foundational aspect of the program including mission, governance, leadership, planning, staffing, organizational commitment, and financial resources.

Teaching and learning standards are already addressed in detail in the first two sets of iNACOL national standards. The online program standards assume that a quality program is already addressing these two standards and thus do not attempt to duplicate them. Instead, the program standards identify “the most critical aspects of those standards” and present a “more comprehensive, ‘macro-level’ set of standards to truly be considered a quality online program.”

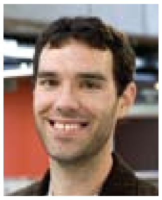
Support standards address how support is provided for the faculty, students, and parents/guardians. They also address the topic of guidance services and organizational support.

Finally, evaluation standards represent the view that a mindset of continual improvement is a necessity for a quality online program and provide standards related to program evaluation and improvement.

In addition to the standards, the Quality Standards for Online Programs document adopted an existing rubric developed by David Graf and Maisie Caines[3] as the basis of rating a program’s performance relative to the standards. The rubric has a 5 point scale ranging from Confusing (1) to Exemplary (5). The committee recognized that with the broad scope of these standards, a good online program would excel in some areas, while perhaps needing additional work in other areas.

A middle rating of Promising (3) is considered the minimal level for a quality online program. However, by its very nature, a rating of Promising indicates that there is room for improvement to the rating of Accomplished (4) or Exemplary (5).

The completion of the iNACOL *National Standards for Quality Online Programs* was truly a collaborative effort involving the contributions of online learning practitioners as well as individuals with expertise in program accreditation. With their release, programs now have the guidelines available to benchmark online learning program performance.



Using Data to Improve Outcomes in K-12 Online Learning

Joseph R. Freidhoff, Michigan Virtual University

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The electronic medium of online learning provides an inherent advantage in data collection compared to physical classrooms because the digital nature of learning, and associated communications such as student registrations, can be automatically captured. Access to more data, however, does not ensure data will be used in meaningful ways. Considering online learning data from pre-course, in-course, and post-course perspectives provides a useful framework for thinking about how data can be leveraged to maximize educational impact.

[3] Graf, David & Caines, Maises. (2000). WebCT Exemplary Course Project Scoring Rubric; retrieved June 23, 2009, http://www.webct.com/Communities/library/iteminformation?source=brosw&objectID=4367802

Pre-course data

Though discussion of data collection in virtual schools often focuses on student performance data collected within the Learning Management System (LMS), data collection and analysis can begin prior to students even beginning their courses. Student enrollment systems often capture student demographic information as well as background information about the schools or areas from which the students are coming. On its own, such information can be used to generate descriptive profiles of online students such as gender, grade-level, and course enrollment statistics. External data sources like the *Common Core of Data*[4] or data available through state agencies can be merged with student enrollment data to yield even richer descriptions such as the percentage of online K-12 students in the online program who come from rural areas or cities, attend Title 1 schools or schools that failed to meet AYP, or go to school with 400 other students or 2,000 other students.

In-course data

Once courses begin, there is a wealth of data available to teachers and support staff to help online students succeed. Many LMS track student login and click activity, among other things. This information captures students' digital footprints allowing for reports to be run that show the time of day and day of the week students are most active, or in which sections of the course they have spent time and those they have yet to access. Some LMS utilize early warning systems that can notify instructors and students if performance falls off. For instance, automatic alerts can be set up to identify students who are not logging in frequently enough. Other signals exist to indicate to students, parents, and teachers that the students are keeping pace in their courses. Data dashboard displays can use graphics or colors such as green, yellow, and red to visually display students' progress toward successful course completion.

Post-course data

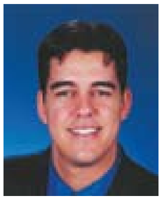
Formative assessment continues beyond the end of courses. Instructors and product development teams utilize data collected from LMS discussion boards, messaging systems and end-of-course surveys to refine course content and pedagogical strategies for future iterations of courses.

Data analysis also shifts to include summative evaluation. Summative analyses can draw on student final scores to calculate completion and proficiency rates for individual students, courses, or teachers, or for all courses within a content area or during a specific semester. More in-depth investigations might compare sub-populations of interest—for instance the performance between males and females, credit recovery students and non-credit recovery students, or first-time online students and returning online students.

A challenge virtual schools face when it comes to data collection and analysis is drawing comparisons with student performance in traditional brick-and-mortar schools. A recent report[5] from the U.S. Department of Education which sought to compare K-12 student performance in face-to-face and online settings found too few K-12 studies to extract research-based recommendations for best practices. Virtual schools will need to develop mutually beneficial relationships with state agencies for sharing information about student performance within traditional school and online environments. Through such data exchanges, online learning data has the potential to transform both virtual and face-to-face classrooms.

[4] National Center for Educational Statistics; retrieved September 14, 2009, http://nces.ed.gov/ccd/

[5] Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*; retrieved July 6, 2009, http://www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf



Innovations in Online K-12 Teaching and Learning

Rick Ferdig, Kent State University

Dr. Richard E. Ferdig is the RCET Research Professor at Kent State University. He is also the Editor of the International Journal of Gaming and Computer Mediated Simulations, the co-editor of the International Journal of K-12 Online and Blended Learning, and the Director of the Virtual School Clearinghouse.

Many early online courses mirrored face-to-face correspondence classes. Teachers and students would send assignments, instructions, questions, and feedback through text and the occasional image; the innovation was the use of email rather than pen and paper. Fast forward to 2010 and you will find virtual schools using *learning* and *content management systems*, *personal learning environments*, *video conferencing*, and other technological tools to deliver synchronous and asynchronous instruction to students throughout the world. Simple text has been replaced by everything from video to interactive virtual worlds, and from games and simulations to portable learning devices.

In our research in the AT&T funded *Virtual School Clearinghouse*[6] project, we have been able to explore online K-12 classes throughout the United States. Although the classes vary in terms of delivery methods, most completely online courses tend to use a learning management system that is either home-grown or provided through a vendor (open source or commercial). In these environments, teachers deliver content through recorded presentations, delivered assignments, video, synchronous chats, asynchronous forums, and various widgets. Widgets could best be described as smaller self-contained tools like online graphing calculators, mathematical simulations, science experiments, etc. Teachers are also finding innovative way to connect with their students through Voice-Over-IP (VOIP), interactive whiteboards, and collaborative online tools (e.g. group software or web-conferencing tools, both open source and commercial).

Due to the extreme variability between and within virtual schools, the curriculum they offer, their pedagogical beliefs, the students they support, and the instructional tools they employ, it is obviously extremely complex to measure which of these tools are directly related to the success or failure of online courses. What we have found, however, is that there is a direct connection between the ability of a teacher to utilize multiple tools to support the learning of their students and the outcomes of those students. In other words, a teacher who is experienced with various technologies and is flexible in his or her thinking is able to provide the content in an appropriate way to meet the needs of his or her students.[7]

Therefore, professional development is obviously critical to the continued success of any virtual school program. However, it is also important for virtual schools to continually evaluate the promise and potential of innovative tools for teaching and learning. Some new tools might engage students in new ways. Others are already providing evidence of helping teachers accomplish their pedagogical goals. And, still others have already been adopted by students and would make excellent delivery platforms for new content. Out of nearly countless potential innovations, following are four key categories that virtual schools should consider.

1. **Social software.** Social software includes such things as blogs, wikis, social networking sites (e.g. Facebook), conferencing tools, and social bookmarking sites. Fears of security, safety, cheating, bullying, and other inappropriate uses have found many schools banning social

[6] *Virtual School Clearinghouse* project; retrieved September 14, 2009, http://www.vsclearinghouse.com/

[7] DiPietro, M., Ferdig, R. E., Black, E.W. & Preston, M. (2008). Best practices in teaching K-12 online: Lessons learned from Michigan Virtual School teachers. *Journal of Interactive Online Learning*, 7(1), 10-35; and Ferdig, R.E. (2006). Assessing technologies for teaching and learning: Understanding the importance of technological-pedagogical content knowledge. *British Journal of Educational Technology*, 37(5), 749-760.

software sites. However, we have found that students learn about classes, plan daily activities, and even get tutoring through such tools. Students report that they value schools being willing to "meet them where they are" and with tools they are already using.[8]

2. **Games and simulations.** Although there is a lot of bad publicity about violence and video games, research tells us: a) games and simulations consume a significant portion of the life of an average student;[9] b) games and simulations can positively motivate students to learn;[10] and c) games and simulations can encourage and support both teaching and learning.[11] Many virtual schools are already using simulations in their courses; much fewer are using actual games. Florida Virtual School made headlines recently by launching Conspiracy Code, aimed at teaching students about history. Virtual schools should continue to examine games and simulations by looking at the possibilities of teaching with commercial games, teaching with educational games, and then also the development of games as an instructional method. Scratch[12], for instance, encourages students to master content in order to create games and animations.

3. **Interactive learning environments.** Existing virtual school content is generally delivered through a learning management system or through video/web conferencing. Innovative schools have begun to expand their practice to consider education in virtual worlds in two important ways. The first is through a personal learning environment (PLE), a system by which students control their own access to learning. Some practitioners refer to a PLE as a mash-up, because it provides a way for students to gather all of their resources into one location. ELGG[13] is an example of a PLE. A second experiment has been with delivery of content through virtual worlds such as Second Life or Activeworlds EDU. Early research has demonstrated engagement in spatial electronic worlds can not only enhance collaboration,[14] but it can also have important outcomes for content skills like mathematics (Kaufmann et al., 2003).[15]

4. **Delivery mechanisms.** Social software, games, and innovative delivery methods like PLEs and virtual worlds all focus on the method of delivery. But it is also important to focus on the reception of content. Most of the traditional methods and even the innovative methods still focus on the student sitting at a desktop or laptop computer. There is very little research on virtual schools using MP3 players, cellphones, web-based mobile devices like iPhones and Blackberries, iTouches, and other personal electronic devices to reach students outside of their home or school environments (Wagner, 2008; Fels et al., 2003).[16] Innovative reception methods will be critical as we move to offer curriculum to elementary grades, where traditional means may not be feasible or appropriate.

[8] Coutts, J., Dawson, K., Boyer, J., & Ferdig, R.E. (2007). Will you be my friend? Prospective teachers' use of Facebook and implications for teacher education. In Crawford, C., Carlsen, R., McFerring, K., Price, J., Weber, R. & Willis, D. A. (Eds.) *Society for Information Technology & Teacher Education International Conference Annual*, 1937-1941. Norfolk, VA: Association for the Advancement of Computing in Education (AACE).

[9] Kahne, J., Middaugh, E., & Evans, C. (2008) "The Civic Potential of Video Games." White paper. The John D. and Catherine T. McArthur Foundation. Available from: http://www.civicsurvey.org/White_paper_link_text.pdf

[10] Garris, R., Ahlers, R., & Driskell, J.E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, 33 (4), 441-467.

[11] Squire, K. (2006). From Content to Context: Videogames as Designed Experience. *Educational Researcher*, 35(8): 19-29; and Ferdig, R. E., & Boyer, J. (2007). Can game development impact academic achievement? *T.H.E. Journal*. [Online]. Available at http://www.thejournal.com/articles/21483

[12] Scratch; retrieved September 14, 2009, http://scratch.mit.edu/

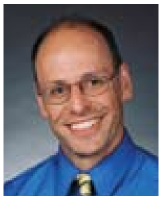
[13] ELGG; retrieved September 14, 2009, http://elgg.org/

[14] Dickey, M.D. (2005). Three-dimensional virtual worlds and distance learning: two case studies of Active Worlds as a medium for distance education. *British Journal of Educational Technology*, 36 (3), 439-451.

[15] Kaufmann, H. & Schmalstieg, D. (2003). Mathematics and geometry education with collaborative augmented reality. *Computers and Graphics*, 27(3), 339-345.

[16] Wagner, E. (2008). Realizing the promises of mobile learning. *Journal of Computing in Higher Education*, 20(2), 4-14; and Fels, D., Samers, P., & Robertson, M. (2003). Use of asynchronous Blackberry technology in a large children's hospital to connect sick kids to school. Paper presented at the *International Conference on Computers in Education*, Hong Kong.

Innovative technologies inherently come with problems. For instance, many schools block games and other social sites through firewalls. Some of the more innovative technologies require higher end computers or faster connections. Convincing parents about the use of some of these tools has been a major source of conflict for some virtual schools. And, training teachers to think differently about education delivery mechanisms takes time and funding. However, each of these innovative means of delivery or reception promise benefits for both teachers and students.



Demographics of Participants in Online Programs

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The demographics of students nationwide who are participating in online learning or virtual schools are largely unknown for two main reasons. First, the breadth of online programs and lack of a common definition of online students mean that many online programs, particularly supplemental programs, do not have to provide demographic data at all. Second, although all public schools, including full-time online schools, must report demographic data, states do not always require each program within a school or school district to report such data. Therefore there is no guarantee that student demographics in a given online school will be disaggregated from the rest of the school or district. Full-time online schools are more likely to collect and report such data than supplemental programs, but even with full-time online schools the data are often not available.

The lack of information about online student demographics has consequences for online learning policy and practice. A recent paper published by the International Association for K-12 Online Learning described the unintentional consequences that may arise from not knowing student demographics. "Without the collection and analysis of disaggregated student data, there is no way to judge if students are treated equally or if students are differentially impacted."[17] Numerous studies in education, employment and online behavior have found wide variations in how people act and are treated due to their name, real or perceived cultural affiliation, and gender.[18]

In an effort to better understand the demographic characteristics of online students nationwide, David B. Glick & Associates, in cooperation with iNACOL, surveyed all member programs of iNACOL in May 2009. Programs were asked to describe the demographics of students in their programs or, if such information was unavailable, the reasons they did not keep or wish to provide such information. Of the 31 programs that responded to the survey, only six programs were willing and able to identify the ethnic demographics of their students. Nine programs provided gender data. Of the programs that did not provide data, nine programs provided reasons for not doing so. For example, four programs indicated that they simply do not collect it, and one program that stated, "We don't feel it would be relevant or helpful." One respondent, Florida Virtual School, comprises the vast majority of students represented.

[17] Rose, R. and Blomeyer, R. (2007). Access and Equity in Online Classes and Virtual Schools. International Association for K-12 Online Learning (iNACOL), p. 6; retrieved July 22, 2009, http://www.inacol.org/resources/docs/NACOL_EquityAccess.pdf.

[18] For example: Spooner, T. and Rainie, L. (2000) African-Americans and the Internet. Pew Internet and American Life Project; retrieved July 22, 2009, http://www.pewinternet.org/~/media/Files/Reports/2000/PIP_African_Americans_Report.pdf.pdf; Madden, M. (2003). America's Online Pursuits: The changing picture of who's online and what they do. Pew Internet and American Life Project; retrieved July 22, 2009, http://www.pewinternet.org/~/media/Files/Reports/2003/PIP_Online_Pursuits_Final.PDF.PDF; and Bertrand, Marianne and Sendhil Mullainathan. "Are Emily And Greg More Employable Than Lakisha And Jamal? A Field Experiment On Labor Market Discrimination," American Economic Review, 2004, v94 (4,Sep), 991-1013. Digest; retrieved July 22, 2009, National Bureau of Economic Research, http://www.nber.org/digest/sep03/w9873.html

Given the small sample size and self-selecting nature of the responses, the survey results are unscientific and cannot be said to represent online programs nationwide. Extreme caution is advised in interpreting the data or drawing any conclusions from it.

The six programs that provided demographic data represent 82,479 students. Tables 1 and 2 below show their demographic breakdown compared against nationwide K-12 student demographics. The data presented hint at possible discrepancies between online populations and national populations as related to race and gender. However, as cautioned above, this data is unscientific and extreme caution must be applied in drawing any conclusions.

Given the wide variety of online programs and the variations and limitations of state reporting requirements, the virtual schooling community would be well served by collecting and sharing student demographic data. Our intent is to survey programs annually to enable the creation of an increasingly valid picture of students participating in online courses on both a full-time and part-time basis. However, identifying the demographic characteristics provides a mere starting point. Ultimately we wish to understand the critical issues of equitable access, opportunity, quality and, ultimately, achievement for all students.

Table 1: Ethnicity of online students in surveyed online programs compared to national demographics.

Students	Six online programs (n = 82,479 students)	Nationwide K-12 demographics (n = 45.9 million[19])
White/non-Hispanic	59.4%	56.5%
Hispanic/Latino	16.1%	20.5%
Black/non-Hispanic	14.1%	17.1%
Other	6.6%	not available
Asian	3.3%	4.7%* (Includes Native Hawaiian/Pacific Islander)
Native American	0.50%	1.2%
Native Hawaiian/Pacific Islander	0.0048%	* (Included in Asian)

Table 2: Gender of online students in surveyed online programs compared to national demographics.

Students	Nine online programs (n = 94,237 students)	Nationwide K-12 demographics (n = 48.4 million[20])
Male	43.3%	51.4%
Female	56.7%	48.6%

[19] National Center for Education Statistics (NCES) (2006). Digest of Education Statistics Table 41; retrieved July 22, 2009, http://nces.ed.gov/programs/digest/d08/tables/dt08_041.asp. Numbers are from 2006, the most recent data available.

[20] National Center for Education Statistics (NCES) (2007). Common Core of Data; retrieved July 22, 2009, http://www.nces.ed.gov/ccd

Online Laboratory Science: An Update on Policy, Research, and Practice

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One of the challenges for high school level online programs is how to teach science courses with a laboratory component, and in particular how to address the laboratory requirements of Advanced Placement (AP) science courses. While this issue has been recognized for as long as online science courses have been offered, its prominence has been raised recently, catalyzed in part by the AP course audit that has been conducted by the College Board.

The specific College Board policy is as follows:

> AP Biology, Chemistry, Environmental Science and Physics courses can only be labeled "AP" if they include a hands-on laboratory and/or field experience component. Schools that cannot meet the minimum time required to be spent engaged in hands-on laboratory or field experiences are eligible for a one-year conditional authorization. The conditional authorization permits the use of the AP designation in conjunction with courses that meet all AP curricular requirements for the course but due to the delivery model cannot meet the minimum time required to be spent in hands-on laboratory investigations and/or fieldwork.

As of August 2009, the College Board is continuing its policy of providing "one-year conditional authorization" to courses that, aside from the lab requirement, meet all other required elements for authorization. This policy is in effect for the 2009-10 school year but is reviewed annually by the College Board and is subject to change in the future.

While this "conditional authorization" policy gives virtual schools and other online course providers some breathing room with respect to approval of their online AP science courses, the College Board is only one of several organizations that have policy statements that are either implicitly or explicitly against accepting online laboratory experiences:

- **College Board:** "For the purpose of the AP Course Audit, the College Board considers computer-based or teacher-led demonstrations neither a virtual nor hands-on laboratory experience in and of themselves, though these elements may enhance the course's primary laboratory component."[21]
- **University of California Office of the President:** "Online lab science courses will not be approved unless they include a supervised wet lab component. Since UC has not seen computer software that adequately replicates the laboratory experience, computer simulated labs will not be acceptable."[22]
- **American Chemical Society:** "The Society believes that computer simulations are not a substitute for student hands-on laboratories from the kindergarten level through undergraduate education."[23]

[21] http://www.collegeboard.com/html/apcourseaudit/faq.html#name2

[22] http://www.ucop.edu/a-gGuide/ag/faq.html#C81

[23] http://portal.acs.org/portal/PublicWebSite/policy/publicpolicies/invest/WPCP_011529

These policies are not well-supported by research. The research literature comparing efficacy of remote, simulated, and hands-on labs has shown that in most cases there is no significant and consistent difference in learning outcomes between students doing hands-on versus remote labs.[24,25] It may be that some of these policies may be based on an outdated perception that all online science is done through "computer simulations." However, members of the K-12 virtual school community know that there is a large and growing toolbox of cyberlearning technologies available, including tools for analyzing geospatial datasets (e.g., Watershed Dynamics[26], Fieldscope[27]), immersive role-playing games (e.g., Urban Science[28], River City[29]), augmented reality games,[30] and remote online laboratories where students run experiments on real lab equipment via their web browser (e.g., The iLab Network[31]), among many others.

These policy statements have real impact on the lives of students, particularly those from underserved areas where access to high quality science courses (AP or otherwise) are limited or non-existent. Without being able to access online AP courses, these students will be at a significant competitive disadvantage when applying for college admissions relative to their peers from larger, wealthier schools that provide a full complement of AP science courses.

In June 2008, the Committee on Online Science of the International Association for K-12 Online Learning (iNACOL) published "Goals, Guidelines, and Standards for Student Scientific Investigations,"[32] a whitepaper intended to help clarify numerous issues raised by the AP Course Audit. The whitepaper, based on authoritative science education publications including *America's Lab Report*,[33] *National Science Education Standards*,[34] and *Benchmarks for Scientific Literacy* (AAAS, 1994),[35] and referencing the relevant research literature, sought to provide specific guidance to science teachers and curriculum developers on how to structure educationally meaningful laboratory experiences in either hands-on or online formats. It also attempted to fill in a policy void between *America's Lab Report* and various policies affecting online science courses. Finally, the whitepaper sought to acknowledge the role that modern scientific tools and practices, including scientific cyberinfrastructure, should play in science education.

iNACOL's Committee on Online Science continues to engage with the College Board and other organizations to help expand student access to rigorous online science courses and resources, to educate all stakeholders on the research supporting the use of cyberlearning tools for science courses, and to advocate for policy change that is inclusive of a range of approaches to providing high quality science learning for students in traditional and virtual school settings.

[24] Ma, J., and Nickerson, J. (2006). Hands-on, simulated, and remote laboratories: A comparative literature review. *ACM Computing Surveys*, 38, No. 3, 1-24.

[25] Triona, L. M. & Klahr, D. (2003) Point and Click or Grab and Heft: Comparing the influence of physical and virtual instructional materials on elementary school students' ability to design experiments. *Cognition & Instruction*, 21, 149-173.

[26] http://www.globe.gov/fsl/html/templ.cgi?watersheds

[27] http://www.fieldscope.us

[28] http://epistemicgames.org/eg/category/games/urban-planning/

[29] http://muve.gse.harvard.edu/rivercityproject/

[30] http://lgl.gameslearningsociety.org/games.php

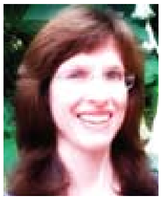
[31] http://www.ilabcentral.org

[32] Jona, K., Adsit, J. with Powell, A and NACOL Online Science Committee. (2008). *Goals Guidelines and Standards for Student Scientific Investigations*. North American Council for Online Learning (NACOL); retrieved August 23, 2009, http://www.nacol.org/docs/NACOL_ScienceStandards_web.pdf

[33] National Research Council. (2006). *America's Lab Report: Investigations in High School Science. Committee on High School Science Laboratories: Role and Vision*, S.R. Singer, M.L. Hilton, and H.A. Schweingruber, Editors. Board on Science Education, Center for Education. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

[34] National Research Council (NRC). (1996). *National science education standards*. Washington, DC: National Academy Press.

[35] American Association for the Advancement of Science (AAAS). (1994). *Benchmarks for science literacy*. New York: Oxford University Press.



Online Course Funding: the Influence of Resources on Practices

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Funding for online courses is an economic, political and educational issue that includes the budgeting process enabling course providers to operate, the actual costs of producing and offering courses, and the price at which courses are provided to students. These components of the funding picture operate within the context of local and national policy as well as competition among course providers.

This overview does not account for the full complexity of the funding environment of virtual courses but rather outlines the factors that influence budgets, costs and prices, and then discusses potential impacts on the student experience.

Virtual courses enrich the education experience of individual students and allow schools to differentiate their programs in response to student needs. Thirty percent of school leaders in a 2008 national survey stated that online and blended courses are financially beneficial in their schools—a number that grew from 25 percent in 2007.[36] The same survey found that nearly 50 percent of school leaders had concerns over course development costs and the funding basis for online and blended courses.

Many of the costs of online programs parallel those of on-ground programs: instructors, administrators, staff, professional development, curriculum and materials, assessment and evaluation, and data systems. Online programs have little to no cost for instructional facilities, transportation, and related staff. However, they must fund a substantial technology infrastructure including a course management system and support staff, as well as course design. Costs of some online courses also include technology devices, infrastructure, and learning facilitators needed for student success.

Virtual school costs and funding models vary widely. Some virtual schools do not fund course development in-house, electing to purchase courses from other providers, thus benefiting from economy of scale. Many virtual schools function as course providers rather than as full-service schools. These schools fund teachers and other staff to manage the administrative and technical aspects of course delivery, but may not provide exceptional education teachers, school counselors, media specialists and resources, clubs and activities, and professional development services.

Any analysis of online course costs and potential efficiencies must account for the range in virtual schools types. Expenditures of virtual schools include:

- Salaries and benefits of teachers, administrators, facilitators, designers and other organizational staff in the school offering the course
- Technology infrastructure including servers, desktop computers, network services, and student computer, if they are provided by the school
- Learning management system and other information systems such as student information

[36] Picciano, A. & Seaman, J. (2009). K-12 Online Learning: A 2008 Followup of the Survey of U.S. School District Administrators. Needham, MA: Sloan Consortium

- Software and licensing
- Professional development and substitute teachers
- Evaluation, accreditation, and memberships
- Services used by the school including security, legal, and insurance
- Other equipment and supplies
- Facilities and utilities, maintenance, loss and replacement
- Promotion, marketing and communications
- Travel

Likewise, any examination of online courses costs must account for the range of services included with the course content and instruction. Factors influencing cost and quality of a course include:

- Course content: currency, alignment with standards, rigor, completeness
- Course media: richness and relevance
- Course interactivity among instructors, students and others
- Student-teacher ratio and success rate to yield cost per successful student
- Services for at-risk, exceptional, and limited-English learners
- School counselors
- Tutors and site facilitators
- Technical support
- Technical and content materials and equipment including lab materials
- Librarians and library materials
- Support for parents
- Extramural activities like clubs, trips and competitions

Several recent trends in online education influence course funding. First, as expertise in online course development and teaching grows in local schools, more schools will franchise or form their own online programs, changing the role of the large established virtual schools from being the direct providers of courses to students. These virtual schools will shift to a supporting role by providing design expertise, teacher preparation and development, data services, and other activities that return courses to local schools and impact funding. Second, open education resources (OER) have become part of the course funding model by making the cost of a course more efficient. Estimating the true costs of offering online courses and the potential efficiencies of designing online and blended courses with OER is complex.


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